



What weather variables are important in predicting heat-related mortality? A new application of statistical learning methods

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Abstract:

Hot weather increases risk of mortality. Previous studies used different sets of weather variables to characterize heat stress, resulting in variation in heat-mortality associations depending on the metric used. We employed a statistical learning method - random forests - to examine which of the various weather variables had the greatest impact on heat-related mortality. We compiled a summertime daily weather and mortality counts dataset from four U.S. cities (Chicago, IL; Detroit, MI; Philadelphia, PA; and Phoenix, AZ) from 1998 to 2006. A variety of weather variables were ranked in predicting deviation from typical daily all-cause and cause-specific death counts. Ranks of weather variables varied with city and health outcome. Apparent temperature appeared to be the most important predictor of heat-related mortality for all-cause mortality. Absolute humidity was, on average, most frequently selected as one of the top variables for all-cause mortality and seven cause-specific mortality categories. Our analysis affirms that apparent temperature is a reasonable variable for activating heat alerts and warnings, which are commonly based on predictions of total mortality in next few days. Additionally, absolute humidity should be included in future heat-health studies. Finally, random forests can be used to guide the choice of weather variables in heat epidemiology studies.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Meteorological Factors, Temperature, Other Exposure

Temperature: Extreme Heat

Other Exposure: apparent temperature;dew point

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Climate Change and Human Health Literature Portal

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Injury, Respiratory Effect, Other Health Impact

Cardiovascular Effect: Heart Attack, Stroke, Other Cardiovascular Effect

Cardiovascular Disease (other): cardiovascular disease mortality

Respiratory Effect: Chronic Obstructive Pulmonary Disease, Other Respiratory Effect

Respiratory Condition (other) : respiratory disease mortality

Other Health Impact: heat related mortality

Model/Methodology:

type of model used or methodology development is a focus of resource

Methodology

Resource Type:

format or standard characteristic of resource

Research Article, Research Article

Timescale:

time period studied

Time Scale Unspecified